What is claimed is:

1. A heat treatment apparatus comprising:

a reaction tube which can contain an object to be heat-treated;

an exhaust pipe, one end of which is connected to said reaction tube, for exhausting gas contained in said reaction tube;

a reactant-gas supplying pipe, which is conducted into said reaction tube, for supplying reactant gas into said reaction tube;

an HF-gas supplying section which includes

an HF pipe connected to a gas source for fluoride hydrogen,

an HF valve which controls to supply fluoride hydrogen from the gas source and which is arranged in the HF pipe, and

an inlet for conducting, into said exhaust pipe and/or said reaction tube, the fluoride hydrogen supplied from the gas source through the HF pipe,

wherein the HF valve is open and the fluoride hydrogen gas is conducted from the gas source into said exhaust pipe and/or said reaction tube, thereby cleaning inside of said exhaust pipe and/or said reaction tube.

2. The heat treatment apparatus according to claim 1, wherein:

other end of said exhaust pipe is split into a first and second vents; and

a valve is arranged between the first and second vents, conducts exhaust gas into the second vent when HF gas is exhausted, and conducts exhaust gas into the first vent when no HF gas is exhausted.

3. The heat treatment apparatus according to claim 1, further comprising:

a plurality of traps which are arranged on said exhaust pipe and which remove a reactive product within said exhaust pipe; and

a pressure control valve which is arranged between said plurality of traps and which maintain pressure within said reaction tube and said exhaust pipe at an optional value.

4. The heat treatment apparatus according to claim 1, wherein:

said reaction tube includes an inner tube, whose upper end is open, and an outer tube, which surrounds the inner tube with a predetermined space and whose upper ends is closed; and

said inlet conducts HF gas into the inner tube, and said exhaust pipe is connected to the outer tube and exhausts gas from the gap between the inner and outer tubes.

5. The heat treatment apparatus according to claim 1, wherein:

said exhaust pipe includes at least one bent part; and

said inlet is arranged on an upstream side of a gas-flowing path and adjacent to the bent part of said exhaust pipe.

6. The heat treatment apparatus according to claim 3, wherein said inlet is arranged on an upstream side of the gas-flowing path relative to said reaction tube and adjacent to the trap of said exhaust pipe.

7. The heat treatment apparatus according to claim 1, wherein:

the reactant-gas supplying pipe conducts alkoxysilane into said reaction tube in order to form a silicon oxide film on the object, and/or conducts ammonia and a silicon compound into said reaction tube in order to form a silicon nitride film on the object: and

said reaction tube forms a silicon oxide film on the object by resolving alkoxysilane, and/or forms a silicon nitride film on the object by a reaction of ammonia and a silicon compound.

8. The heat treatment apparatus according to claim 7, wherein said exhaust pipe includes:

an SiO_2 product trap, in the exhaust pipe, which removes a reactive product produced by resolving alkoxysilane within said exhaust pipe;

an SiN product trap which removes a reactive product produced by a

reaction of ammonia and a silicon compound within said exhaust pipe; and

a heater which heats up said SiO_2 product trap in a range between 100 to 150℃.

9. The heat treatment apparatus according to claim 8, comprising the pressure control valve for maintaining pressure within said exhaust pipe at an optional value and the heater heating the pressure control valve between said SiO_2 product trap and said SiN product trap. by controlling an opening degree of a gas-flowing path of said exhaust pipe.

10. The heat treatment apparatus according to claim 3, wherein said pressure control valve maintains pressure in said exhaust pipe at a pressure value of 10kPa or greater.

11. The heat treatment apparatus according to claim 1, further comprising a heater which heats up said exhaust pipe to a temperature in a range from 100 to 150℃.

12. The heat treatment apparatus according to claim 1, further comprising a pressure controller which controls pressure of fluoride hydrogen within said exhaust pipe to be fluctuated.

13. The heat treatment apparatus according to claim 12, wherein said pressure controller controls the pressure within said exhaust pipe to be fluctuated in a range between 0.1kPa to 30kPa.

14. The heat treatment apparatus according to claim 12, wherein said pressure controller controls the pressure within said exhaust pipe to be fluctuated in such a way that a period at which the pressure is 10kPa or higher and a period at which the pressure is lower than 10kPa are cyclically repeated, and that the period at which the pressure is 10kPa or higher can be obtained longer than the period at which the pressure is less than 10kPa.

15. The heat treatment apparatus according to claim 1, further

comprising:

a purge-gas supplying section which supplies purge gas into said exhaust pipe and/or said reaction tube; and

an exhaust device which is connected to said exhaust pipe,

wherein, after said HF-gas supplying section stops supplying fluoride hydrogen, said purge-gas supplying section and said exhaust device repeat a plurality of cycles of exhausting and supplying purge gas into said exhaust pipe and/or said reaction tube are repeated, and

said reactant-gas supplying pipe supplies reactant gas during the plurality of cycles.

16. The heat treatment apparatus according to claim 15, wherein:

said reactant-gas supplying pipe supplies alkoxysilane as the film-forming gas; and

said purge-gas supplying section supplies nitrogen gas as purge gas.

17. A method of cleaning at least one of a reaction tube which is included in a heat treatment apparatus and an exhaust pipe which is connected to the reaction tube, said method comprising:

a loading step of loading an object to be heat-treated into the reaction tube;

a first film-forming step of forming a first film on the object, by supplying first reactant gas into the reaction tube;

a second film-forming step of forming a second film on the object, after stopping supplying the first reactant gas into the reaction tube and supplying second reactant gas which differs from the first reactant gas; and

a cleaning step of removing a product produced in said first film-forming step and a product produced in said second film-forming step, which attache to at least one of the reaction tube and the exhaust pipe, by exhausting gas contained in the reaction tube through the exhaust pipe and supplying fluoride

hydrogen gas into at least one of the reaction tube and the exhaust pipe.

18. The cleaning method according to claim 17, comprising:

a raising step of raising temperature of the reaction tube and heating up the exhaust pipe in a range from 100 to 200℃; and

a maintaining step of maintaining pressure within the exhaust pipe in a range between 10kPa to 30kPa.

19. The cleaning method according to claim 17, comprising a cleaning step of cleaning at least one of the reaction tube and the exhaust pipe by supplying fluoride hydrogen gas thereinto, while controlling the pressure within the exhaust pipe to be fluctuated in a range between 0.1kPa and 30kPa.

20. The cleaning method according to claim 17, comprising a controlling step of controlling pressure within the exhaust pipe to be fluctuated in such a way that a period at which the pressure is 10kPa or higher and a period at which the pressure is less than 10kPa are cyclically repeated, and that the period at which the pressure is 10kPa or higher can be obtained longer than the period at which the pressure is less than 10kPa.

21. The cleaning method according to claim 17, comprising:

a removing step of removing impurities being exhausted in a plurality of positions of the exhaust pipe by a trap: and

a controlling step of controlling pressure of fluoride hydrogen gas in a position between the plurality of traps, by controlling an opening degree of a gas-flowing path of the exhaust pipe.

22. The cleaning method according to claim 17, said method including a removing step of removing fluoride hydrogen gas by:

decompressing the exhaust pipe, after stopping supplying the fluoride hydrogen gas;

supplying film-forming gas into at least one of the reaction tube and the

exhaust pipe, after repeating supplying purge gas and decompressing the exhaust pipe for a given number of times; and

repeating supplying purge gas and decompressing the exhaust pipe for a given number of times again.

23. The cleaning method according to claim 22, wherein:

the purge gas is composed of nitrogen gas; and

the film-forming gas includes alkoxysilane.

24. The cleaning method according to claim 17, wherein:

said film-forming step includes a step of forming, on an object to be heat-treated, a silicon oxide film by resolving alkoxysilane;

said second film-forming step includes a step of forming, on the object, a silicon nitride film by a reaction of ammonia and a silicon compound;

said cleaning step includes a step of exhausting the reaction tube through the exhaust pipe and a step of supplying fluoride hydrogen into at least one of the reaction tube and the exhaust pipe, thereby removing a reactive product which is produced by resolving alkoxysilane and a reactive produce which is produced by a reaction of ammonia and a silicon compound and both of which attach to at least one of the reaction tube and the exhaust pipe.